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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/540,113	03/31/2000	Wolfgang Renz		2414

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PATENT DEPARTMENT  
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EXAMINER

FETZNER, TIFFANY A

ART UNIT PAPER NUMBER

2859

DATE MAILED: 07/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/540,113

Applicant(s)

RENZ ET AL.

Examiner

Tiffany A Fetzner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 17 June 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_
- 4) ☒ Interview Summary (PTO-413) Paper No(s). 17.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED Final ACTION**

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Response to Arguments***

3. Applicant's arguments filed 06/17/2003 have been fully considered but they are not persuasive. Applicant's amendments successfully overcome the Edelstein 4,620,155 reference issued October 28<sup>th</sup> 1986, without adding new matter, however Applicant's arguments with respect to **claims 1-13** are moot in view of the new ground(s) of rejection, necessitated by amendment and set forth below.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1-10, 13** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Srinivasan et al.**, US patent 5,602,479 issued February 11<sup>th</sup> 1997.

6. With respect to **Three times amended Claim 1, Srinivasan et al.**, teaches and shows a NMR / MRI magnetic resonance radio frequency coil (i.e. which is interpreted by the examiner as a type of "NMR Antenna subsystem" because in the NMR / MRI art an RF coil or RF probe, is used to supply and/or receive RF electromagnetic radiation effectively functioning as an "RF antenna subsystem". **Srinivasan et al.**, teaches and shows that magnetic resonance radio frequency coil "has a plurality of at least five antenna elements [See Figures 7, 2, 4, 6, 10, and 11, which show a multi element NMR / MRI birdcage type antenna with "at least five antenna elements" [See components 82, and / or 122, abstract, col. 4 line 33-through col. 8 line 35; Figures 7, 2, 4, 6, 10, and 11]. **Srinivasan et al.**, also teaches and shows "each antenna having an element beginning" (i.e at common ring 114, or virtual ground 118 or circular electrode 84) [See Figure 7, col. 6 line 16 through col. 8 line 35, or col. 4 line 28-col. 5 line 29], "and an element end" (i.e. at end ring 122, or end ring 80). [See col. 4 line 33-through col. 8 line 35; Figures 7, 2, 4, 6, 10, and 11].

7. Additionally, **Srinivasan et al.**, teaches and shows "said antenna elements being disposed relative to a center axis so as to radiate from the respective element beginnings to the respective element ends outwardly in a spoke-like fashion to allow a radially directed current flow in each antenna element between the element end thereof and the element beginning thereof" [See Figure 7, col. 6 line 16 through col. 8 line 28] "and exhibiting cyclical symmetry from antenna element to antenna element;" [See Figure 7] "said antenna elements being at least magnetically coupled with each other in said antenna" [See col 7 lines 34-38; Figures 6, 7, 8 col. 6 line 16 through col. 8 line 28].
8. With respect to **Claim 2**, **Srinivasan et al.**, shows and teaches that "the respective element beginnings and the respective element ends are also connected to" a virtual "ground". [See components 118, and 84 col. 4 line 14 through col. 8 line 28; Figures 2, 3, 6, 7, 10, 11] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2**.
9. With respect to **Claim 3**, **Srinivasan et al.**, shows, and teaches that "said antenna elements are electrically coupled to each other." [See col 7 lines 34-38; Figures 6, 7, 8 col. 6 line 16 through col. 8 line 28.] The same reasons for rejection, that apply to **claim 1** also apply to **claim 3**.
10. With respect to **Claim 4**, **Srinivasan et al.**, shows, and teaches from the diagrams of Figures 2, 6, 7, and 11 that "the respective element beginnings are electrically connected to each other via a ring-shaped connecting element." [ See Figures 2, 6, 7, and 11 which, the ring element 114 connects the beginnings of

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col. 4 line 13 through col. 8 line 28] The same reasons for rejection, that apply to **claims 1, 3** also apply to **claim 4**.

11. With respect to **Claim 5, Srinivasan et al.**, shows, and from the diagrams of Figures 2, 6, 7, and 11 that "the respective element ends are electrically connected to each other via a ring-shaped connecting element." [See Figures 2, 6, 7, and 11 components 120, 80, which, connect the antenna elements col. 4 line 13 through col. 8 line 28.] The same reasons for rejection, that apply to **claims 1, 3** also apply to **claim 5**.

12. With respect to **Claim 6, Srinivasan et al.**, also teaches, and shows, that "the respective element beginnings are electrically connected to each other via a first ring-shaped connecting element and wherein the respective element ends are electrically connected to each other via a second ring shaped connecting element." [See Figures 2, 6, 7, and 11 components 120, 114, and 80, which, connect the antenna elements and col. 4 line 13 through col. 8 line 28.] The same reasons for rejection, that apply to **claims 1, 3, 5** also apply to **claim 6**.

13. With respect to **Claim 7, Srinivasan et al.**, shows, and suggests from the diagram of Figures 6, 7, 10, 11, where segments 110, and 122 branch off from end ring 114, such that each of the end point antenna elements on end ring 114, "has two branching element ends." (i.e. the end that has component 122 connecting to end ring 120, and the element end that has components 110 connecting to point 118). [See Figures 6, 7, 10, 11,] The same reasons for rejection, that apply to **claim 1** also apply to **claim 7**.

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14. With respect to **Claim 8, Srinivasan et al.**, shows, from the figures that "the respective element beginnings define an element beginning plane and wherein the respective element ends define an element end plane, and wherein said element beginning plane and said element end plane are parallel to and spaced from each other." [See Figures 2, 6, 7, 11; col. 6 line 16 through col. 8 line 28] The same reasons for rejection, that apply to **claim 1** also apply to **claim 8**.

15. With respect to **Claim 9, Srinivasan et al.**, shows, and suggests from the diagram of Figure 7, that "the respective antenna elements are linear." [See Figure 7 col. 6 line 16 through col. 8 line 28] The same reasons for rejection, that apply to **claims 1, 8** also apply to **claim 9**.

16. With respect to **Claim 10, Srinivasan et al.**, shows, and suggests from the diagram of Figure 3, that "the respective antenna elements define respective line directions, said line directions intersecting said center axis at a common point", [See Figure 7 where center point 118 which is the center of point of both outer ring 20 and inner ring 114. Additionally, Figures 7, 11 and 6 also suggest that all the elements have the same central axis point.] The same reasons for rejection, that apply to **claims 1, 8**, also apply to **claim 10**.

17. With respect to **Claim 13, Srinivasan et al.**, shows, from the diagram of Figure 7 that "the plurality of elements" (i.e component 122) "is" 16, and since a plurality of 16 elements is inherently "divisible by 4". **Srinivasan et al.**, shows, that the plurality of antenna elements "is divisible by 4". The same reasons for rejection, that apply to **claim 1**, also apply to **claim 13**.

***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. **Claims 11, 12** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Srinivasan et al.**, US patent 5,602,479 issued February 11<sup>th</sup> 1997.

21. With respect to **Claim 11**, **Srinivasan et al.**, teaches and suggests that the junction of points of all the legs of the RF coil are merged into a common circular electrode 84 which interconnects the legs at a virtual ground [See Figures 2, 6, 7, 10, 11; col. 4 lines 29-31] **Srinivasan et al.**, also teaches and suggests, exciting the magnetic resonance receiving coil at a common single virtual ground eliminates the need for balanced matching and the use of traps in the ground loops (i.e. components 80, 114, and 120). [See col. 5 lines 7-10, Figures 2, 6, 7, 10, 11] This teaching also directly suggests that annular ring components 80, 114, and 120 also function as grounding loops within the



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**Srinivasan et al.**, MRI RF coil antenna assembly. Because the 'grounding loops' 80, or 114, or 120 and common circular electrode 84, function to connect the legs and virtual ground point 118 in a plane parallel to the plane defined by annular 'grounding loops' 80, or 84, or 114, or 120 **Srinivasan et al.**, shows and suggests in the RF coil structure, an annular "grounding plate" disposed parallel to said element beginning plane and said element end plane, and said common point" (i.e. point 118) "being disposed in said grounding plate." [See Figures 2, 6, 7, 10, 11; col. 4 line 13 through col. 8 line 28].

**22.** The examiner notes that the term "grounding plate" is not directly stated by the reference, It would have been obvious to one of ordinary skill in the art at the time that the invention was made, that the structure, teachings, and figures of the **Srinivasan et al.**, directly suggest s a virtual ground plate, that includes point 118 within it, because point 118 is parallel to all of the annular ring components, and satisfies all conventional grounding criteria. [See col. 4 line 13 through col. 8 line 28.] The same reasons for rejection, that apply to **claims 1, 8, 10** also apply to **claim 11**.

**23.** With respect to **Claim 12**, which is similar to **claim 1** with the exception that it lacks the feature that said common point" (i.e. point 118) "being disposed in said grounding plate." **Srinivasan et al.**, shows, and suggests, from the diagrams of Figures 2, 6, 7, 10, 11; and the teachings of col. 4 line 13 through col. 8 line 28 a "grounding plate disposed parallel to said element beginning plane and said element end plane." [See the specific rejections, figures and

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teachings of claim 11, which need not be reiterated.] The same reasons for rejection, that apply to **claims 1, 8, 10, 11**, also apply to claim **12**.

#### **Prior Art of Record**

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- A) McArthur** US patent 2,735,074 issued Feb. 14th 1956; which shows a magnetic resonance reactance antenna device. [Figure 6]
- B) Oppelt et al.**, US patent 5,153,517 issued Oct. 6th 1992; An MRI RF coil structure.
- C) Hashoian et al.**, US patent 5,168,230 issued December 1st 1992. [See Figures 1, 2, 4 and the entire disclosure in general, since this reference is similar to, and cites the prior art Edelstein reference, the examiner suggests applicant review this reference in preparation for any future response.]
- D) Prammer et al.**, US patent 6,268,726 issued July 31st 2001, filed January 15th 1999. [See Figures 4, 22a, 22b, 25, 26]. Which show an MR antenna in an NMR logging tool.
- E) R.L. Barrish et al.**, US patent 2,281,404 issued April 28th 1942. Early MR RF antenna structure.
- F) Pissanetzky et al.**, US patent 5,659,281 issued August 19th 1997. [See Figures 3a, 3b Which shows an MRI RF antenna coil structure].
- G) Slade** US patent 6,215,304 B1 issued April 10th 2001, filed January 19th 1999 with a priority date of January 21st 1998. [See Figure 3 which shows an RF antenna sensor for NMR well logging]

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H) **D** finition number 4 of <sup>1</sup>radial on page 962 of **Merriam Webster's Collegiate Dictionary Tenth Edition 1997** ="developing uniformly around a central axis".

I) **Mansfield** US patent 5,143,688 issued September 1<sup>st</sup> 1992 ; which shows an elliptical surface coil structure for use within magnetic fields.

J) **Edelstein** US patent 4,620,155 which shows a multi segment RF NMR antenna structure.

25. Applicant's amendment overcame the **Edelstein reference** but also necessitated the new ground(s) of rejection presented in this Office action.

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

26. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

### **Conclusion**

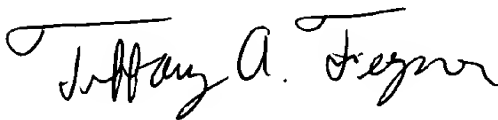
27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is

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(703) 305-0430. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

28. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached on (703) 308-3875. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

29. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



TAF  
30 June 2003



**Diego Gutierrez**  
**Supervisory Patent Examiner**  
**Technology Center 2800**